TROUBLE SHOOTING

Class 4000

I Machine Jammed

See points 21, 23, 27, 28.

II Division Start Fails

See points 10, 11, 12, 19, 26.

III Return Stepping Comes Too Early or Fails Entirely

See points 1, 2, 3, 4, 5, 7, 22.

IV Division Run Stops Too Early

See points 6, 7, 8.

V Division Run Never Stops

See points 9, 24 and III.

VI Quotient and Remainder are Printed at the Same Time

See points 19, 20.

VII The Wrong Result is Printed

See III and IV and points 15, 16, 17, 18.

VIII A Remainder of Minus 1 Appears on the Tape

See points 13, 14.

IX Multiplication Blocked

See point 25.

Printed in Sweden

TROUBLE SHOOTING

Class 4000

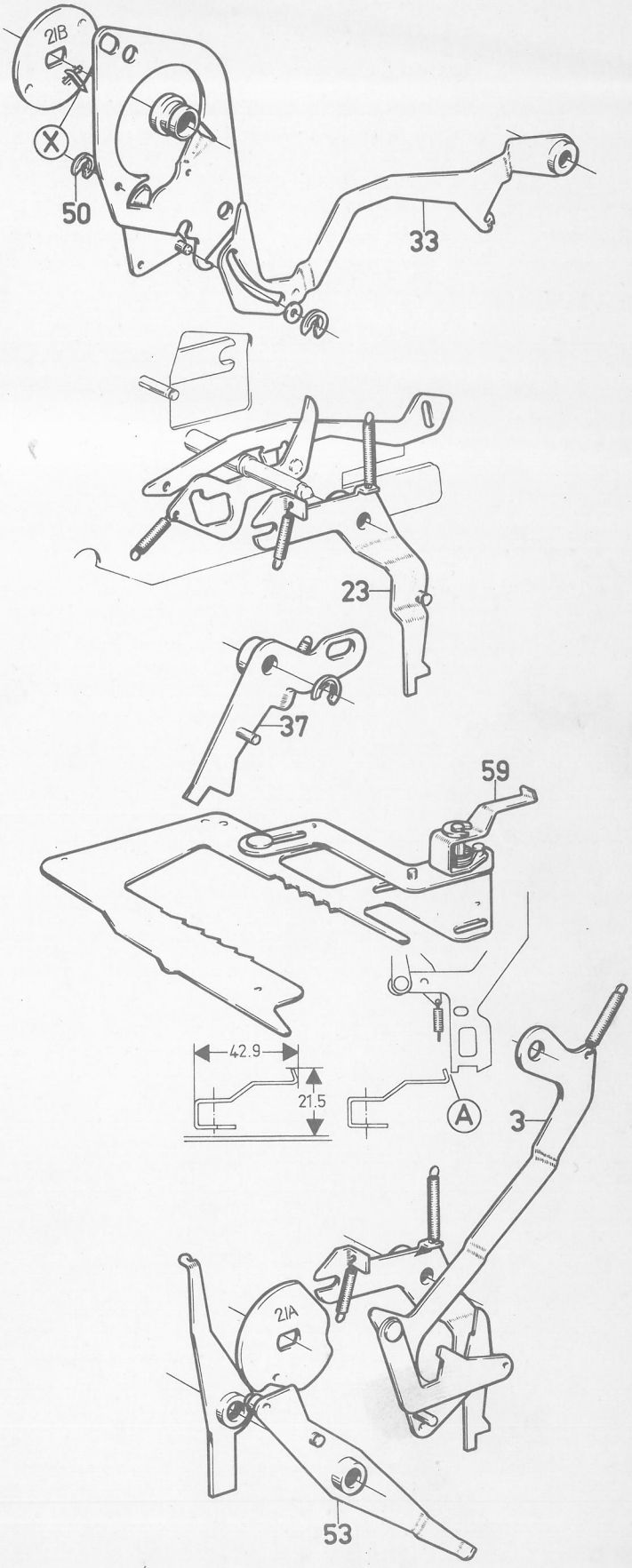
1. Check for free movement of Block Out Cam Lever. (Spare Parts Catalogue Page 12 ref. No. 33) Also make sure the coupling finger (X) is not damaged.

2. Make sure the Feeler Bell Crank does not bind (Spare Parts Catalogue Page 12 ref. No. 23)

3. Make positive the Decade Slide Intermediate Lever does not bind. (Spare Parts Catalogue Page 9 ref. No. 37)

4. Check that there is a clearance of at least 1 mm between the Feeler (Spare Parts Catalogue Page 6 ref. No. 59) and the carry-over units when these drop down into their released position (see A).
   Correct Feeler to dimensions in fig. if it has been locked.

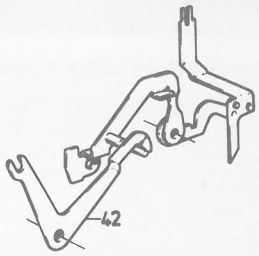
5. Check that the Feeler Coupling Carrier Arm and the Feeler Cam Lever move without interference (Spare Parts Catalogue Page 12 ref. No. 3 and 53).



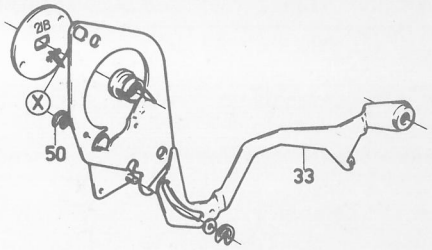
TROUBLE SHOOTING

Class 4000

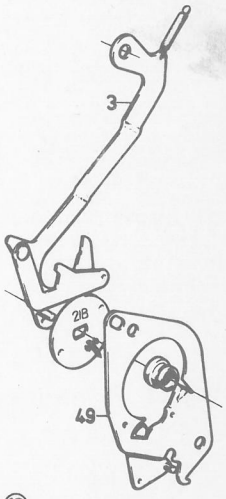
6. Check that the Add Back Latch has a secure hold (also sideways) on the stud of the Outer Subtraction Setting Lever. (Add Back Latch shown in Spare Parts Catalogue Page 9 ref. No. 42)



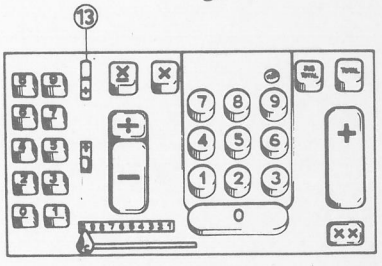
7. Check that the Retainer is in position. (Spare Parts Catalogue Page 12 ref. No. 50)



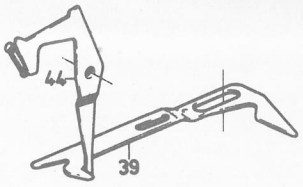
8. Check Feeler Coupling Carrier Arm (Spare Parts Catalogue Page 12 ref. No. 3) is in its right position <u>between</u> the side frame of the machine and the Guide Plate (49).

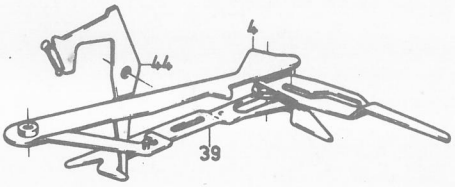


9. A number is divided by 0. Stop division by pulling Plus/Minus Knob forward (13).

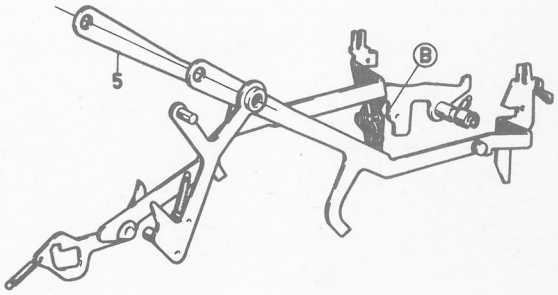


10. Check that the vertical leg of the Feeler Bell Crank Blocker (44) is behind (= motor side of) the lug of the Restoring Slide (39). With the leg on the wrong side, the Four Stroke Start Lever (4) cannot be fully restored. It may therefore prevent proper function of the Decade Slide Driver and through this the Decade Slide slips back to initial position.

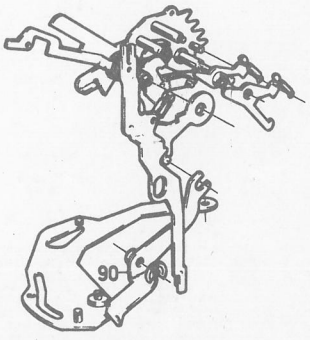




11. Check that the Division Toggle Link of the Div. Key Lever moves without bind.



12. The Aut. Sub-Total Lever (90) must not press downward too hard on the Cut Out Lever Cam when in operating position. Excessive friction will cause the cam to bind and block division start. Form Aut. Sub-Total Lever (90) if required.



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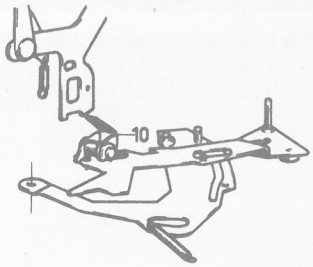
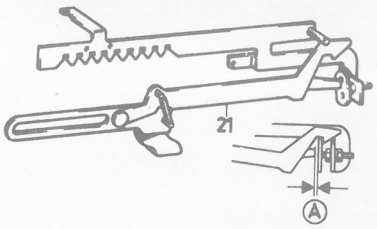
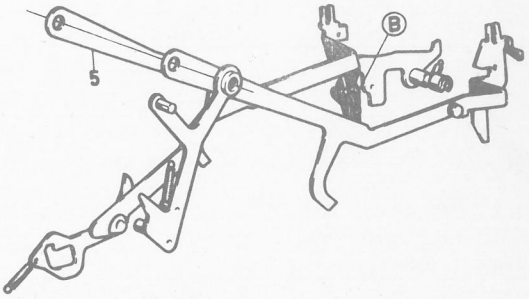
13. Check that the Carry-Over Stop (10) moves freely and has sufficient play to come into blocking position under the right carry-over unit. (Spare Parts Catalogue Page 6)



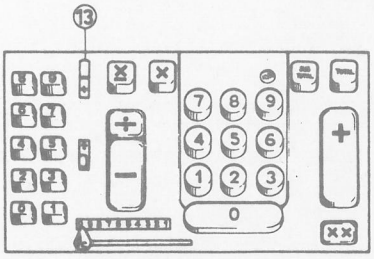
14. Check that there is a clearance (A) of .2 mm between Stop Carriage Pincher (21) and the screw. Turn screw half-turns for adjustment. (Spare Parts Catalogue Page 10)



15. Check that the Blocking Lever (B) riveted to the Division Key Lever (5) has a secure hold on the stop plate of the Stop Carriage. If not, the key may be depressed before the stop carriage is in the correct position, causing faulty division. (Spare Parts Catalogue Page 12)



16. Investigate if the operator has possibly pulled the Plus/Minus Lever (13) forward during division. Instruct operator to do so only when he wants to interrupt division before the full and correct answer has been printed on the tape.



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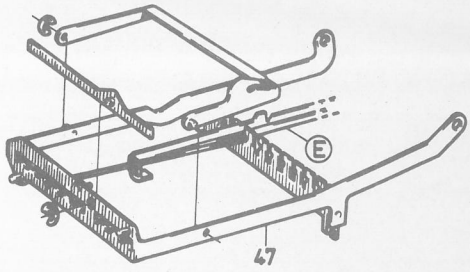
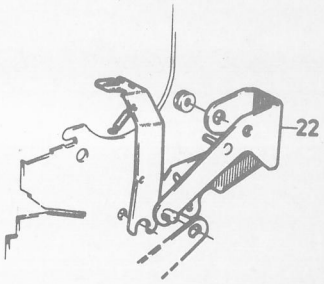
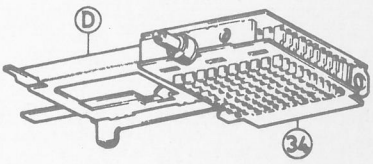
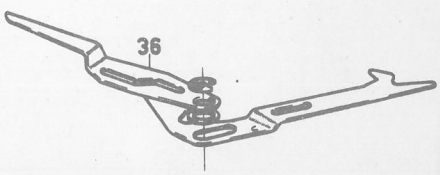


17. Make positive that the Factor Bail (47) is rised high enough during Total operations. The Sector Arms must clear the Trap Door of the Stop Carriage, else no or the wrong quotient and remainder may be printed, part of the item remaining in the totalizer. Lack of lift may be due to deformation of the Activating Bail (22), in which case it is advisable to install a new one.
(Spare Parts Catalogues Pages 18 and 14)



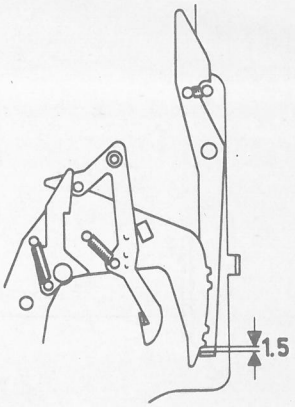


18. Make sure the Trap Door (D) moves freely and the Sector Arms have sufficient clearance to allow the "stroke-counting" type bars to get up to their 9-position.

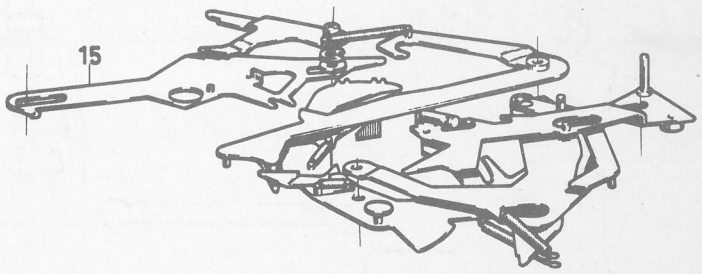


19. Check that the Sector Latch Detent (36) is free of binds.
(Spare Parts Catalogue Page 6)

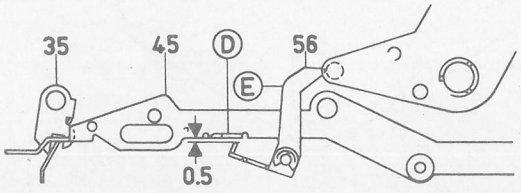
20. Check that the 4-stroke Segment has an afterplay of about 1.5 mm when being loaded for a Quotient and Remainder run.



21. Make positive that the Drive Pawl Blocker (15) easily returns to initial position (towards the key board side) after the 4-stroke segment has been loaded. If it stays in latched or an intermediate position it will block the machine during a following division.



22. The Start Detainer (E) must be so adjusted that there is a clearance of maximum .5 mm to the lug (D) of the Universal Slide, after trip-off. Should the universal slide become free too early at the end of a stroke it would prevent return stepping (via the Stop Carriage Lock) and block the machine.
(Parts Catalogue Page 16 ref. No. 56, Page 15 ref. No. 45 and Page 18 ref. No. 35)



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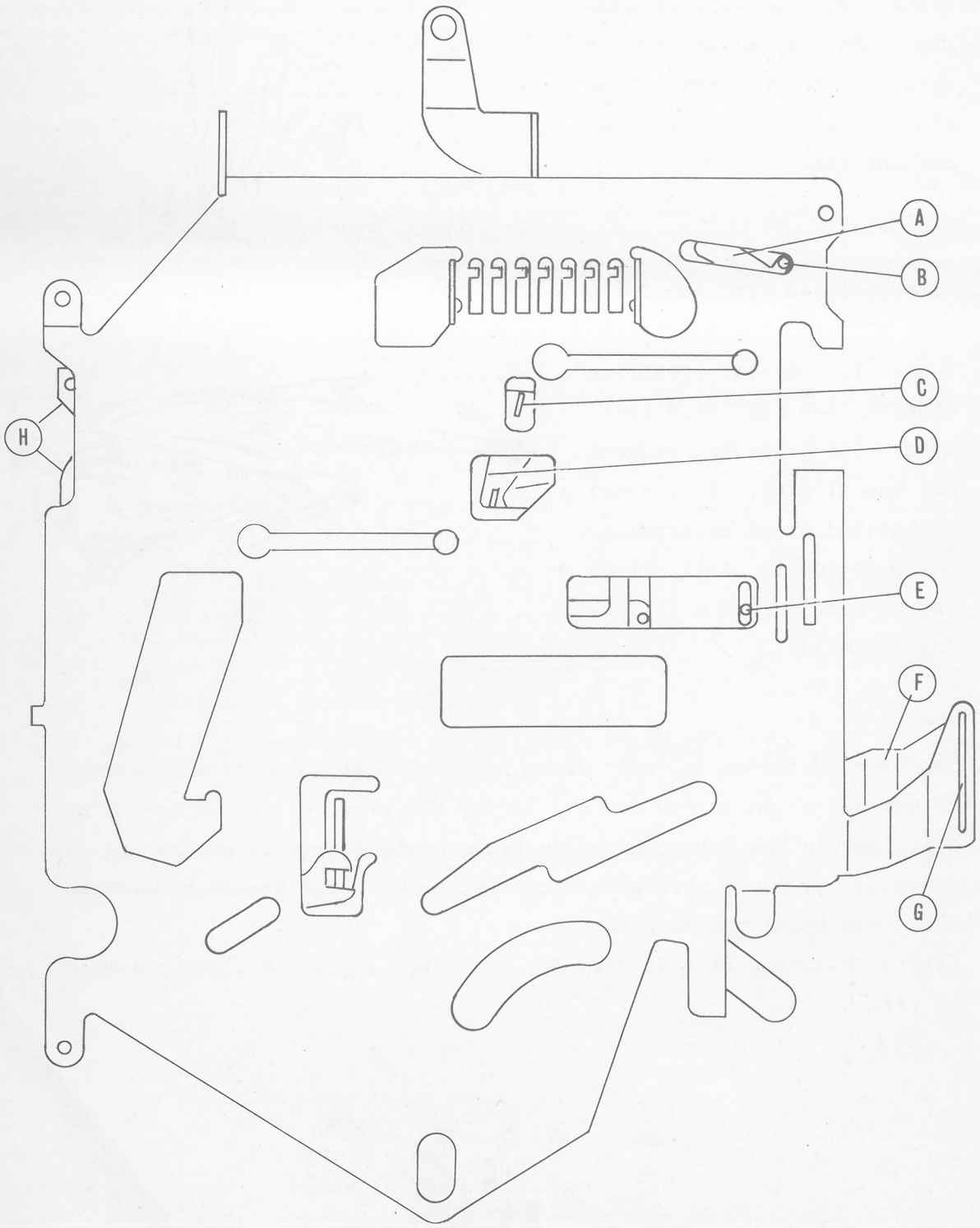

A
B
C
D
E
F
G
H

23. Check that the Decade Slide is in initial position. If the contour marked "D" is visible in the aperture as indicated in the fig. the Decade Slide is in its right position. Should the position be otherwise, the slide can be released by lifting the lug marked "C" of the Decade Slide Driver. Also refer to 24.

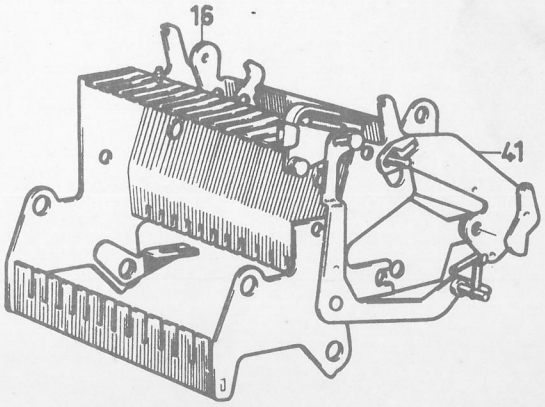
24. Make sure the stud marked "E" is properly located in the slot of the Decade Slide as indicated in the figure.

25. Check that the slot marked "G" is open. If not, release the Blocking Slide (F) that covers the slot, by manipulating the Trip Levers (H). If this happens during normal use, also check per 26.

26. The stud (B) of the Four Stroke Start Lever must have an initial position in the bottom of the slot of the Restoring Slide Cam (A) as shown in the figure. If it has not, the Four Stroke Start Lever is probably bent and must be replaced.

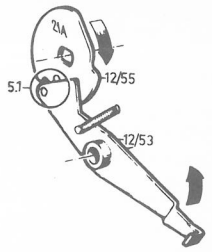
27. If the Sector Stopping Arms (over the Stop Carriage in the key board) are bent, it is probable that Repeat and Division Keys have been forced down simultaneously. Straighten the sector stopping arms, check for clearance in relation to the Trap Door (zero stop of the stop carriage), increase security by replacing Roller 2294036 (ref. No. 11 on Page 12) with one 2294039, and instruct operator to avoid excessive force.

28. Check that the stud of Decimal Setting Bridge(16) is in the slot of the Decimal Release Cam (41). Extensive damage can be caused if the machine is run with this stud out of the slot.

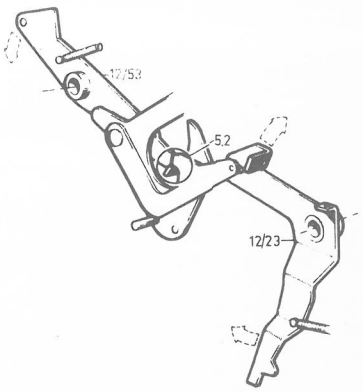


5. Setting the Division Section of the Bottom Bearing Plate in active position

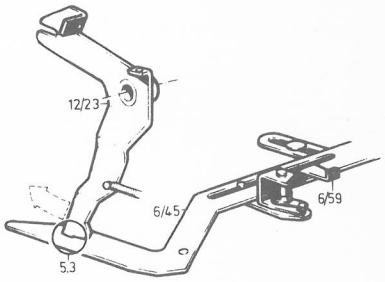
5.1. Cam "21 A" starts rotating and actuates the Feeler Cam Lever (12/53).



5.2. The Feeler Cam Lever (12/53) engages the Feeler Coupling which moves the Feeler Bell Crank (12/23) as indicated by an arrow. (The entire function cycle of the Feeler Bell Crank is described in a diagram on page 16).

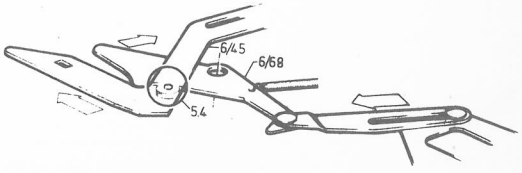


5.3. The Feeler Bell Crank (12/23) moves the Feeler Operating Lever (6/45) and the Feeler (6/59) towards the rear.



5.4. The Feeler Operating Lever (6/45) actuates the Stop Carriage Return Driver (6/68) by a Roller.

N.B. This happens during the first stroke only.



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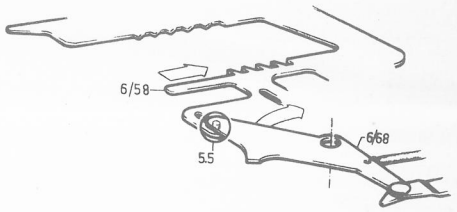
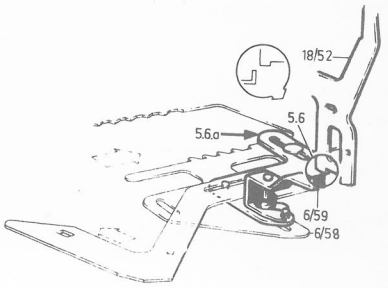
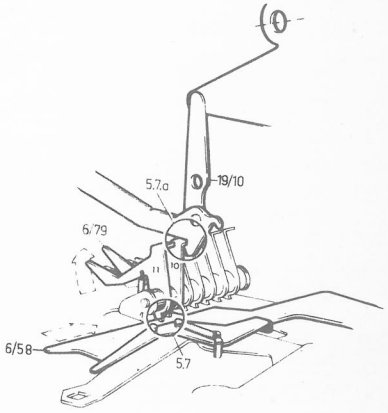
5.5. The Stop Carriage Return Driver (6/68) starts moving the Decade Slide (6/58) into active position through the Stud (5.5).



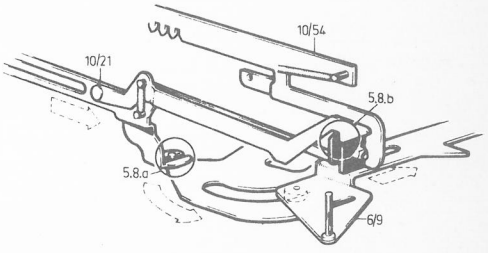
5.6. The Feeler (6/59) is fulcrumed on the Feeler Slide (5.6.a) and has its rest position to the left of the 11th carry-over unit. It now follows the Decade Slide sideways and the Feeler Operating Lever rearwards so that it comes behind the 11th carry-over unit.



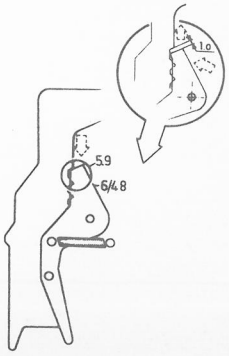
5.7. The Decade Slide (6/58) is moved into active position, its rear edge touching the 11th and 10th Sector Latches (6/79). The 11th sector latch is set into an intermediate position whilst the 10th latch seizes (5.7.a) the rear Sector Arm and locks. This is the "Splitting".



5.8. The Pincher Actuator Arm gets its movement from the Stop Carriage Return Driver (6/68), see point 5.4., and moves (5.8.a) the Stop Carriage Pincher (10/21) towards the Factor Rake (10/54). The Pincher Hook slides over the edge of the Adjusting Screw (5.8.b). During this movement also the Universal Blocking Slide (6/9) is pushed backwards.



5.9. The Decade Slide Detent (6/48) snaps in behind a tooth by spring tension and prevents backward movement of the Decade Slide.



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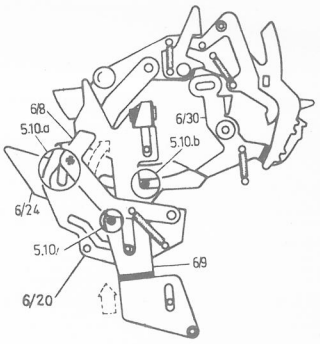
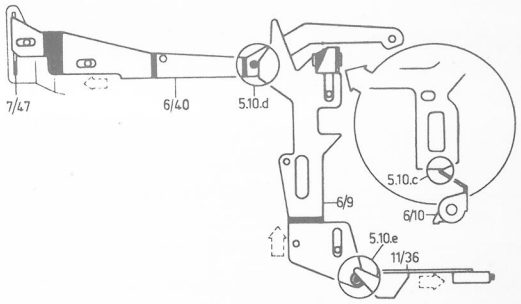
5.10. These are the functions of the Universal Blocking Slide (6/9):



a. It disengages the automatic Sub-Total function (Cut Out Lever Cam 6/20) through moving the Coupling Arm Stud (6/8) out of the notch of the Four Stroke Segment (6/24).

b. It blocks Total and Sub-Total keys through the Locking Slide Turner (6/30).

c. It blocks the rightmost Carry-Over Unit by the Stop (6/10).

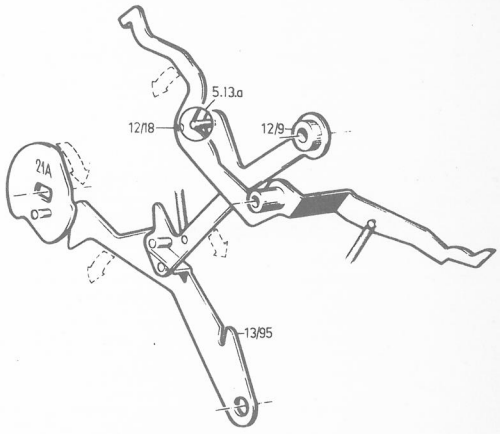


d. It blocks Multiplication starts by the Locking Slide (6/40).

e. It blocks the Numeral Keys through the Ball Locking Slide (11/36).

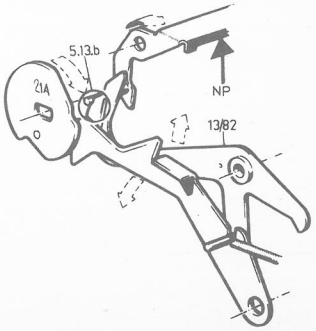
5.11. The Type Bars move up (Example on Page 5, 2nd stroke). The 11th Type Bar gets up to 9-position in Non Print (refer to 4.5). The 10th Type Bar is locked (refer to 5.7). The other Type Bars move up to the position that corresponds to the setting in the Stop Carriage (the Divisor).

5.12. The Totalizer turns into Subtraction.



5.13. The Divisor 120000000 is printed on the tape. A stud of Cam "21 A" actuates the Feed Cut-Out Lever (13/95) which:

a. Disengages Paper Feed by moving the Paper Feed Cut Out Lever (12/9) down on the Paper Feed Dog (12/18).



b. Sets total Non Print (<u>all</u> type bars) via Non Print Lever (13/82) and Non Print Bridge (17/69).

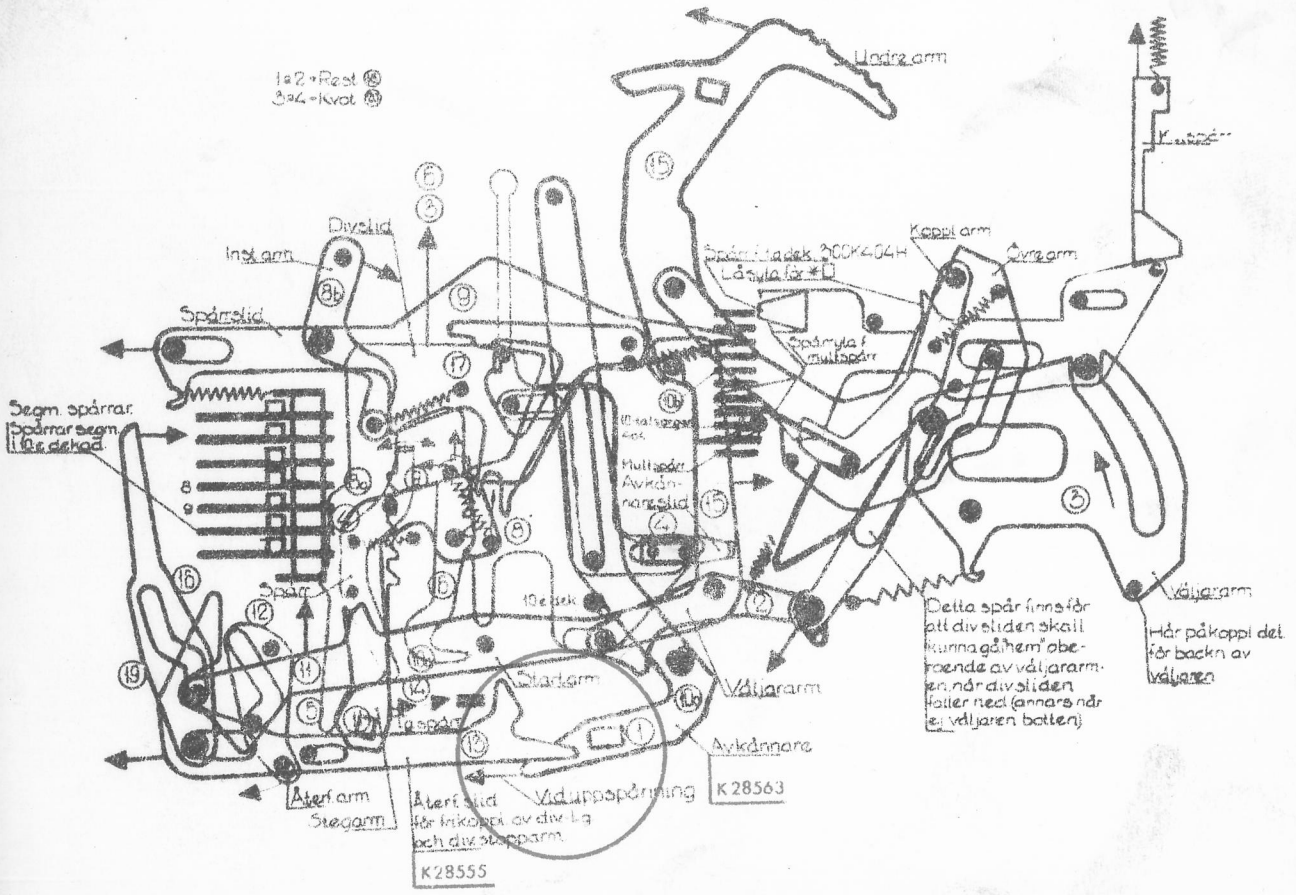
Printed in Sweden

D I V I S I O N

1. Do not run

the machine for division unless the Bottom Bearing Plate [4-stroke mechanism] is in place. Division work without these parts would cause extensive damage to other parts and a rather time-consuming repair.

Before removal or installation of the bottom bearing plate a Total and, after that, minus 1 should be taken. Pull the machine through the minus stroke by hand until the Return Step Hook [Stop Carriage Restoring Lever] is about to move off the roller of the Stop Carriage Actuating Anchor. In this position, i.e. before the restoring lever has been knocked off, the bottom bearing plate may be installed. Make positive that the Restoring Slide K28555 is on top of the Feeler Operating Lever K28563.

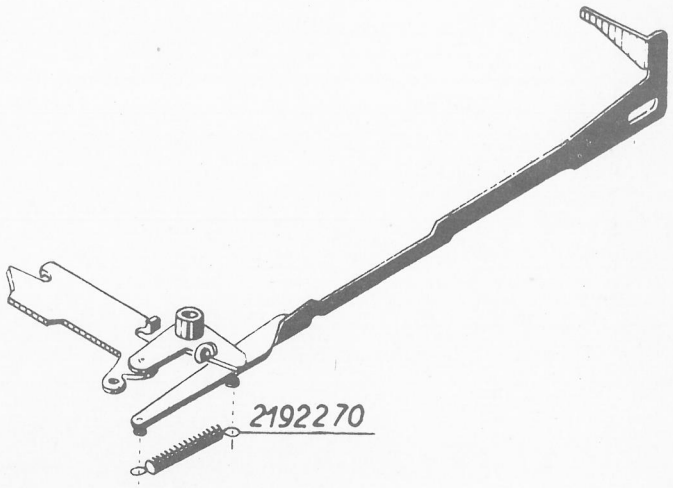


S T E P - O - M A T I C

Modifications

1. New Spring in Step-Over Linkage (Class 4000)

In 4000-machines with automatic completion zeroes we have had the trouble that the Escapement Bracket was not given full stroke for operation. The trouble was due to the Spring 2192176 (see fig.) not being sufficiently strong to overcome the resistance during step-over after multiplication. A stronger spring, Part No. 2192270, is therefore used for this part now. Machines produced after June 1962 have this new spring, and you are advised to replace in such machines as have any sign of weakness on the step-over mechanism.



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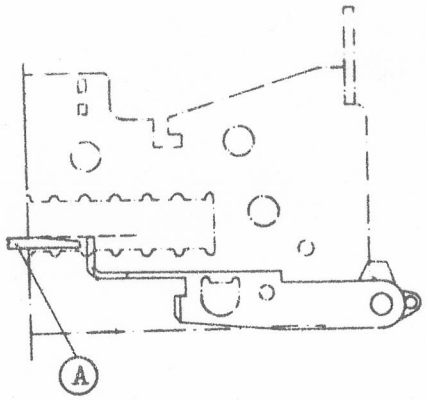
3. "9" in Front of Indexed Figures

a. If the escapement pin to the left of the item indexed in the stop carriage jumps up, a 9 will be printed in front of the figures. To prevent this, adjust the Escapement Stop (A) upwards.

After the adjustment check that the 9 pins move in over the Escapement Stop without hesitation even at slow depression of the keys. If not, adjust back by a slight amount.

We will soon change the stud on which the restoring spring is hooked, so it makes a stop upwards for the Restoring Hook No. 22327.

b. The spring of the restoring hook 22327 should be changed to 2192029. Machines made after October 1962 have this spring. Please make a note of the new number on page 5 (ref. 60) of the Parts Catalogue for series 353 and 2353.



4. Step-over after Repeat Start, Series 2353

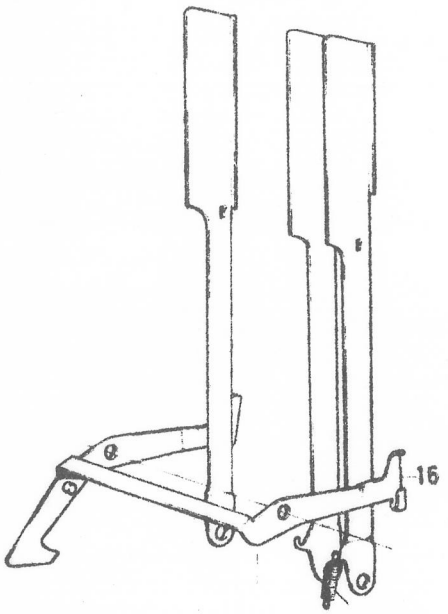
If machine has tendency to step over after repeat start the spring between Step-over Coupling 20200 and Step-over Setting Bridge 28114 should be changed to 2192269.

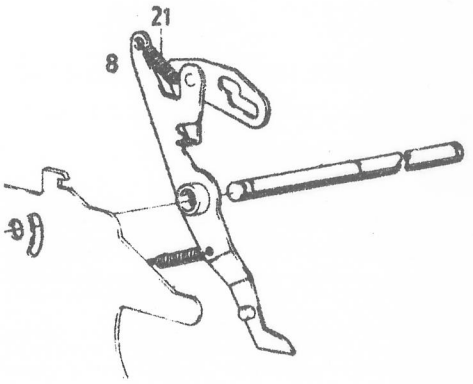
This spring is in production from machine No. 2353-202076.
Please change the number in the catalogue for machine 2353 on page 9 (ref. 33).

5. New Bichrome Cam Spring

Some cases of breakage of the Bichrome Cam Spring (21) have been reported and a new spring will therefore be introduced. The new spring carries the part No. 2192280 and will be delivered for replacement free of charge until May 1963.

As the 2192280 is slightly weaker than the formerly used springs it is essential that the Bichrome Cam (8) and the Ribbon Guide (16) be checked for free movement. It may be necessary to remove stock from the Top Plate to guarantee free movement.

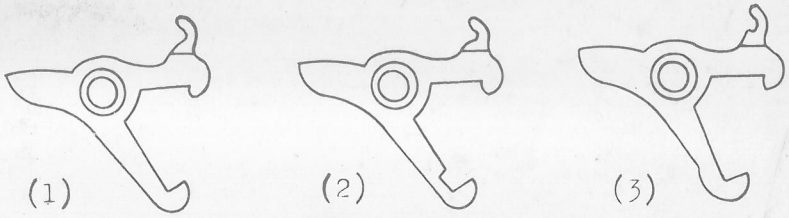




14. Totalizer Coupling falls too early
(concerns models with two registers in the 40- and 50-series).

A modification that will give a more secure engagement has been made on the Grand Total Dog K24421.

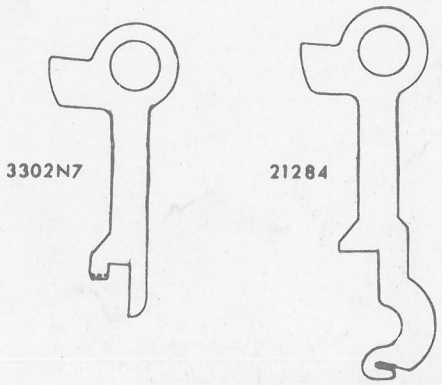
The pictures below show 1) earlier design 2) provisionally adjusted part and 3) the design of the part which has now been brought into production. Part per 1) is rejected.



Greater security has been obtained through the installation of the Universal Slide Guide 1071N2. This guide has been left out in a number of machines and ought to be fitted when the machine is taken in to a workshop for other action.

15. Machine failing to add Crossing Stroke before Total and Sub-total after Negative Multiplication (Class 3- and 4000).

Make positive Start Balance Blocker 21284 is installed. Some machines have the 3302N7 (15/32 in SA 174) together with spring 2193101 instead. Correct spring for 21284 is 2193133.



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16. Machine Locked by Lifting Arm (Class 3- and 4000)

The Lifting Arm K3308 (variants) may get jammed on top of the driving segment stud. This would block the machine, a trouble experienced specially on the 4000.

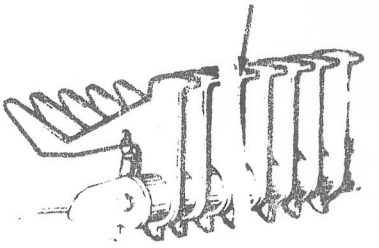
To eliminate the problem we have changed the measure 13,4 to 14,5. (See fig).

17. New Sector Catch Spring (Class 4000)

To make sure the 3rd sector catch from the left is not thrown into engagement at the wrong time its spring should be changed to 2192.2500 (new number for 2192250). Other sector catches keep the 2192021. The Sector Catches are shown on page 5 of Spare Parts Catalogue no SA 174 where the spring has got the reference number 27.

In Production from the following Serial Numbers:

4353 - 143006
4653 - 142736



18. Improved Guidance of Multiplier Arm (Class 3- and 4000)

For improved guidance of the Multiplier Arm K2075 (SA 174: 12/9) it is advisable to install one Washer 2151.0560 between side frame and arm, and one between Multiplier Segment (12/11) and Bichrome Lever (12/12). This change is expected in production in October 1966.

19. Lock Washer (Class 3- and 4000)

Key Board Fixing Screw 2121.0210 has a tendency to come loose. Install Lock Washer 2154.0030 (=2154003) to secure screw.

20. Improved Latching of Total Group (Models with two Registers)

The Start Balance (SA 174 15/29) may actuate the Latch (15/28) when operating. The latch then fails to latch the Total Actuator (15/36) which consequently falls too early during the stroke. To prevent this we are shamfering the latch per Fig. 1. The change per Fig. 2 will come in production later.

The shamfered latch is found in machines produced week 44 of 1966 and after. Machines delivered from production before this date should be modified per Fig. 1.

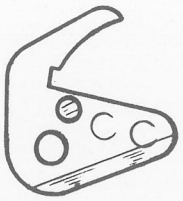


FIG.1

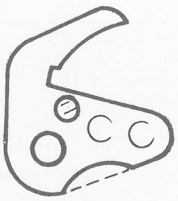


FIG.2

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20. Improved Latching of Total Group (Models with two Registers)

The Start Balance (SA 174 15/29) may actuate the Latch (15/28) when operating. The latch then fails to latch the Total Actuator (15/36) which consequently falls too early during the stroke. To prevent this we are chamfering the latch per Fig. 1. The change per Fig. 2 will come in production later.

The chamfered latch is found in machines produced week 44 of 1966 and after. Machines delivered from production before this date should be modified per Fig. 1.

FIG.1

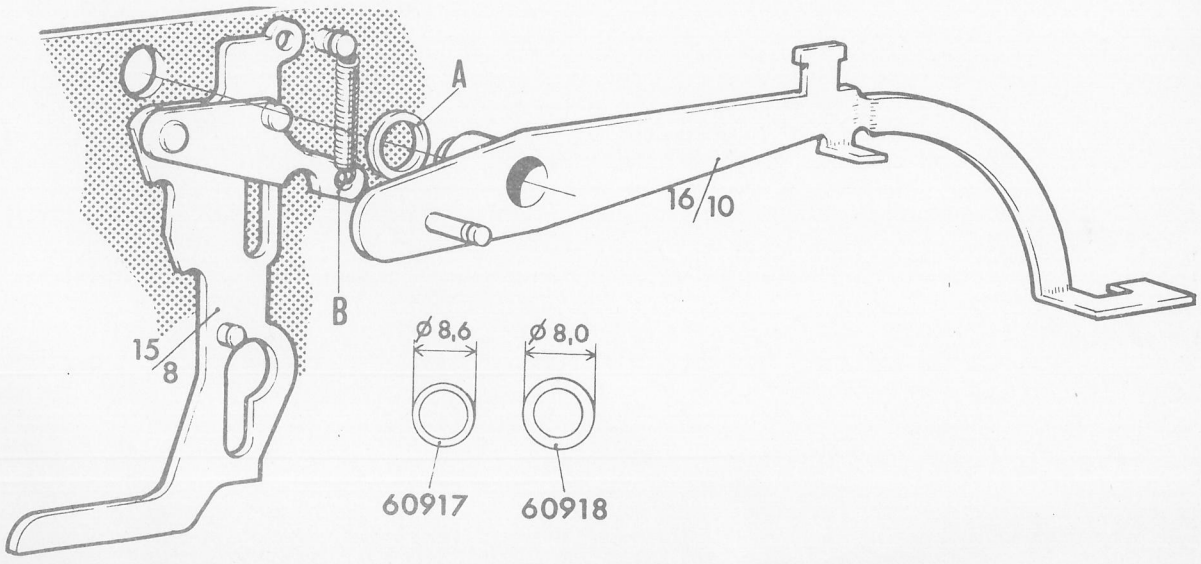
FIG.2

21. Distorsion of Symbol Sector

If the centre shaft wrongly moves down for engagin the totalizer while the symbol selector arm is in position for Non Add, the cam of the centre shaft will cause extensive damage to this arm. The Non Add amount will also be accumulated in the totalizer.

This error may occur at manual Non Add if there is a bind in the Disengaging Slide 15/8. The symbol is set directly by the Non Add Key, but the disengaging slide will remain in its upper position while only the spring lever "B" is moved downward by the Non Add Lever (SA 174 16/13).

A more secure operation of the Disengaging Slide is obtained by reducing the play in relation to the bushing of the Starting Lever 16/10. For this purpose two collars "A" of different thickness are available. Install the one giving the least possible play back/forward.



This page supersedes Section 20, Page 13, November 1966.

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22. Spring 2196.034 rubs on hub of Internal Credit Signal (Class 600)

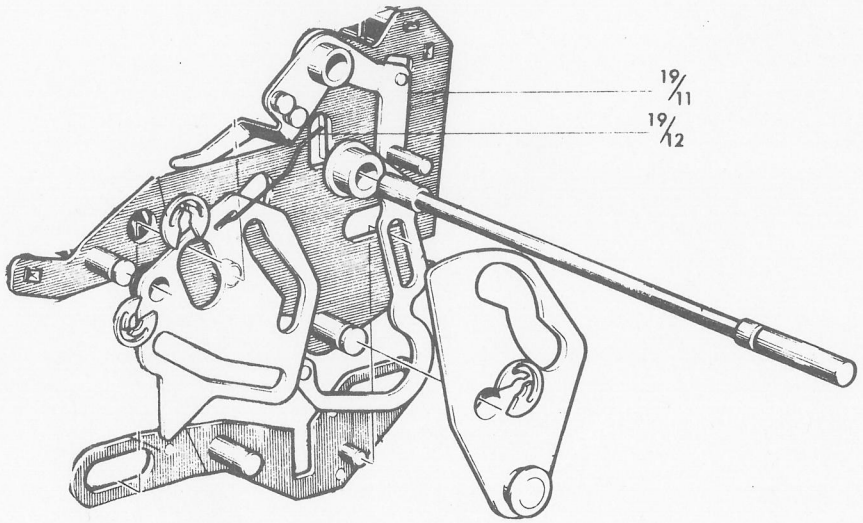
To reduce the risk of breakage Spring 2196.034 (SA 174:19/12) is now shortened by .3 mm. At the same time it was necessary to modify the spring posts of Internal Credit Signal (19/11).

The modification is in production since November 17th 1966.

The corresponding spring of model 7653 (2195.036) was replaced by 2196.047 (SA 209:26/11) which is slightly stronger. The change required a modification also in the spring seating of Shift Cam K3987 (26/14). This modification is in production since December 11th 1966.

Parts concerned:

	Internal Credit Symbol	Spring	Shift Cam
Class 600:	K3964N10	2196.034	---------
Mod. 3- och 4653:	K3994N3	2196.034	---------
Mod. 7653:	K3964N10	2196.047	K3987N5



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ADDO

S T A R T S

Modifications

1. Broken Universal Slide Spring

The Universal Slide Spring [9] has broken in some machines [specially 2000-class] because of interference with the stud [C]. This fault is cured by the introduction of a modified universal slide, modification in this case meaning that the stud is located 1 mm higher up.

As replacement of the universal slide is a rather complicated affair, we have made a special spring for repair purposes. The spring must be so hung as indicated by the upper figure. In models where the Latch [10] has got no spring post, one should be riveted in the hole which is already there. The Repair Spring has the part number 2192242 and the Spring Post 2132043.

It is expedient to replace the spring in all machines of 2000-class below Serial No. 685427. In other models replacement is necessary only if the original spring breaks.

Spring 2192242 and Spring Post 2132043 will be delivered free of charge until June 1961.

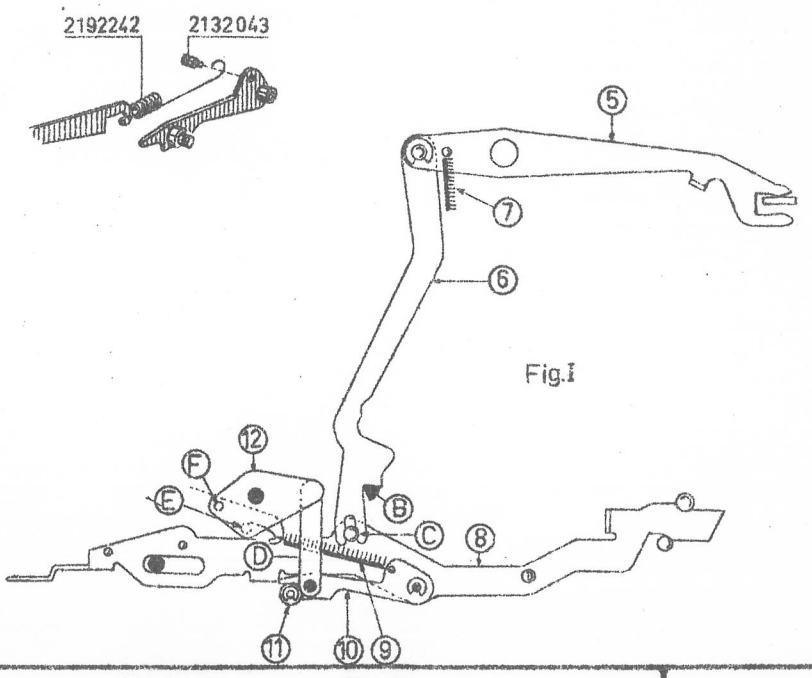

Fig.I

ge supersedes Section 18II, Page 1, April 1960